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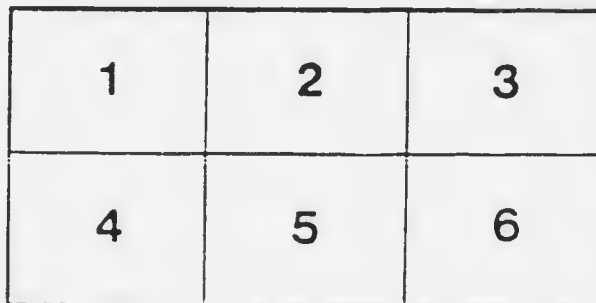
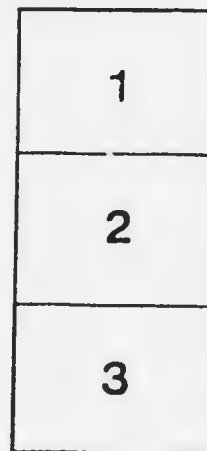
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PUBLICATIONS

OF THE

Dominion Observatory

OTTAWA

W. F. KING, C.M.G., LL.D., *Director.*

Vol. II, No. 3

Orbit of ω Cassiopeiæ

BY

REYNOLD K. YOUNG, Ph. D.

OTTAWA
GOVERNMENT PRINTING BUREAU
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ORBIT OF ω CASSIOPELÆ.

BY REYNOLD K. YOUNG, Ph.D.

The binary character of ω Cassiopeiæ ($\alpha = 1^h 49^m \cdot 0$, $\delta = +68^\circ 15'$, 1910, mag. 5.2, type B9) was announced by Adams in 1912.* Fifty two spectrograms, taken at this observatory during 1913, 1914, 1915, have been used in determining the orbit.

The general features of the spectrum may be judged from Table 1 which contains in order the elements, the wave-lengths used, the residuals, and the number of times each line was measured. The residual for any line is the mean (algebraic or arithmetic) of all the residuals for that line. The separate residuals are found by subtracting the velocity as given by the plate from the velocity as given by the line.

*Astrophysical Journal, vol. 35, p. 172.

TABLE 1.

Element	Wave-Length	Algebraic Residual	Arithmetic Residual	Number of times measured
Calcium.....	3933.869	- 0.1 km.	3.4 km.	11
Calcium.....	3968.625	+ 5.6 km.	7.2 km.	3
Helium.....	4026.352	+ 1.2 km.	7.1 km.	30
Hydrogen.....	4101.890	- 0.1 km.	5.5 km.	1
Hydrogen.....	4128.211	+ 1.6 km.	7.3 km.	21
Silicon.....	4131.017	0.0 km.	5.5 km.	21
Silicon.....	4267.3	- 5.8 km.	5.8 km.	2
Carbon.....	4310.631	0.0 km.	4.6 km.	17
Hydrogen.....	4388.100	- 4.1 km.	7.6 km.	
Helium.....	4471.676	- 1.0 km.	6.9 km.	30
Helium.....	4481.400	+ 0.6 km.	4.0 km.	46

TABLE II.
MT. WILSON AND YERKES OBSERVATIONS.

Observatory	Julian Date	Phase	Velocity	O. C.
Yerkes	2,418,570.78	32.60	- 35	+ 1.6
Mt. Wilson	9,021.65	65.95	+ 12	+ 1.8
Mt. Wilson	9,055.78	28.16	- 16	- 2.0
Mt. Wilson	9,056.77	29.15	- 41	- 0.7
Yerkes	9,267.84	30.46	- 28	+ 11.0
Yerkes	9,361.51	51.21	- 7	- 2.4
Yerkes	9,366.58	59.28	- 1	- 6.5
Mt. Wilson	9,410.71	33.49	- 41	- 2.5

TABLE III.
OTTAWA OBSERVATIONS OF ω CASSIOPEE.

Plate	Observer*	Date	Julian Date	Phase	Velocity	Weight	O. C.
		1913					
5725	Y	Sept. 30	2,420,041.81	35.31	- 39.4	2½	- 1.4
5759	Y	Oct. 7	048.80	42.30	- 29.5	2½	- 0.9
5780	P	Oct. 13	051.80	48.30	- 21.7	3½	- 6.2
5801	Y	Nov. 6	078.56	2.11	- 4.6	1½	+ 5.4
5811	C	Dec. 8	110.63	34.21	- 35.6	1	+ 3.1
5830	P	Dec. 17	119.63	43.21	- 42.2	1	- 15.2
5845	P	Dec. 22	124.69	48.27	- 24.8	1	- 6.3
5863	P	Dec. 31	133.65	57.23	- 5.6	3	- 5.1
		1914					
5869	Y	Jan. 1	134.51	58.42	- 2.7	2	- 4.0
5879	P	Jan. 5	318.65	62.23	+ 8.5	1½	- 0.5
5913	Y	Feb. 5	169.56	23.21	- 47.0	2½	+ 1.0
5932	H	Feb. 12	176.66	30.32	- 38.4	1½	+ 4.7
5938	Y	Feb. 15	179.53	33.49	- 45.5	1½	- 5.4
5971	Y	Mar. 5	197.51	51.20	- 27.4	1½	- 14.4
5972	Y	Mar. 11	203.52	57.17	- 5.5	2	- 4.9
5981	Y	Mar. 19	241.52	65.18	+ 6.0	3	- 4.3
6294	Y	Aug. 21	366.82	10.72	- 47.9	3	- 6.3
6303	C	Aug. 24	369.80	13.70	- 46.9	2½	- 1.0
6316	C	Aug. 26	371.87	15.77	- 49.4	1½	- 1.8
6321	Y	Aug. 27	372.85	16.75	- 54.3	2	- 6.2
6378	Y	Sept. 15	391.67	35.57	- 41.1	3½	- 3.4
6410	Y	Sept. 20	396.71	40.61	- 21.1	3	+ 10.0
6423	Y	Sept. 22	398.65	42.55	- 28.2	3½	0.0
6430	G	Sept. 25	401.86	45.76	- 26.7	2½	- 4.0
6434	Y	Sept. 27	403.83	47.63	- 13.6	4	+ 6.0
6448	G-C	Sept. 30	406.73	50.63	- 2.1	2	+ 11.9
6458	Y	Oct. 1	407.76	51.66	- 11.0	3½	- 1.9
6467	C	Oct. 2	408.69	52.59	- 11.8	3	- 1.5
6481	Y	Oct. 1	410.70	54.60	+ 3.5	2½	+ 9.3
6488	Y	Oct. 11	417.85	61.75	+ 11.9	3½	+ 3.7

TABLE III
OTTAWA OBSERVATIONS OF ω CASSIOPELE—*Continued*

Plate	Observer*	Date	Julian Date	Par	Velocity	Weight	O.C.
		1914					
6500	Y-H	Oct. 13	2,420 419.75	63.65	+ 0.9	4	- 0.2
6506	Y	Oct. 20	426.67	0.65	- 0.5	3	+ 2.5
6516	P	Oct. 21	427.82	1.80	- 45.6	1	- 6.8
6536	C	Oct. 28	434.80	8.78	- 27.1	3	+ 9.4
6539	Y	Oct. 31	437.81	11.81	- 44.9	2	- 1.4
6545	C	Nov. 2	439.78	13.76	- 43.7	3	+ 2.3
6552	H	Nov. 3	440.72	14.70	- 49.4	1	- 2.5
6654	Y	Dec. 2	489.55	63.53	+ 12.2	3	+ 2.2
6656	P-C	Dec. 23	490.58	64.56	+ 15.9	2	+ 5.6
6660	H-Y	Dec. 25	492.62	66.60	+ 33.4	2	+ 4.3
6665	Y	Dec. 30	497.61	1.66	- 4.8	5	+ 3.2
6672	Y	Dec. 31	498.66	2.72	- 19.1	3	- 6.4
		1915					
6678	P	Jan. 4	502.63	6.69	- 25.1	2	+ 4.9
6686	Y	Jan. 5	503.61	7.67	- 35.0	2	- 1.6
6700	Y	Jan. 10	508.50	12.56	- 46.7	3	- 2.1
6708	Y	Jan. 12	510.60	14.64	- 48.8	3	- 2.0
6717	Y	Jan. 16	514.66	18.52	- 45.6	2	+ 3.7
6718	Y	Jan. 19	517.66	21.72	- 50.9	2	- 2.4
6720	C	Jan. 20	518.64	22.67	- 55.7	1	- 7.5
6729	Y	Jan. 24	522.47	26.5	- 40.1	3	+ 6.7
6739	Y	Jan. 26	524.46	28.52	- 41.2	3	+ 3.5
6741	P	Jan. 27	525.53	29.59	- 43.1	3	+ 0.7

*P=Plaskett; P=Parker; C=Cannon; H=Harper; G=Gibson; Y=Young.

MEASURES OF ω CASSIOPELE.

λ	5725		5759		5780		5801		5811		5830		5845	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
3933 869	- 51.0	$\frac{1}{4}$	- 37.9	$\frac{1}{2}$	- 52.2	$\frac{1}{2}$	- 7.2	$\frac{1}{4}$	- 29.3	$\frac{1}{4}$	- 26.4	$\frac{1}{4}$	- 16.7	$\frac{1}{2}$
4026 352	- 58.6	$\frac{1}{2}$	- 49.4	$\frac{1}{2}$	- 50.5	$\frac{1}{4}$	- 1.9	$\frac{1}{4}$	- 38.2	$\frac{1}{4}$	- 20.9	$\frac{1}{4}$		
4101 890					- 22.4	$\frac{1}{2}$								
4128 244	- 42.7	$\frac{1}{4}$	- 29.4	$\frac{1}{4}$	- 33.4	$\frac{1}{2}$								
4131 047	- 49.0	$\frac{1}{2}$	- 47.4	$\frac{1}{2}$										
4267 3					- 39.4	$\frac{1}{4}$								
4340 634	- 55.9	$\frac{1}{4}$			- 25.4	$\frac{1}{2}$	- 4.6	$\frac{1}{2}$	- 24.8	$\frac{1}{2}$	- 43.2	$\frac{1}{4}$	- 9.4	$\frac{1}{4}$
4388 100					- 49.8	$\frac{1}{4}$					- 34.5	$\frac{1}{4}$		
4471 676	- 52.8	$\frac{1}{4}$	- 44.3	$\frac{1}{4}$	- 44.4	$\frac{1}{4}$					- 53.0	$\frac{1}{4}$		
4481 400	- 56.9	$\frac{1}{2}$	- 39.8	$\frac{1}{4}$	- 43.3	$\frac{1}{4}$	- 16.6	$\frac{1}{2}$						
Weighted mean	- 53.4		- 41.7		- 35.4		- 8.6		- 29.2		- 33.1		- 14.2	
V_a	+ 14.02		+ 12.50		+ 11.06		+ 4.22		- 6.08		- 8.79		- 10.21	
V_d	- 0.03		- 0.04		- 0.07		+ 0.04		- 0.05		- 0.95		- 0.10	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 39.1		- 29.5		- 24.7		- 4.6		- 35.6		- 42.2		- 24.8	

MEASURES OF ω CASSIOPELE.—*Continued.*

λ	5863		5869		5879		5913		5932		5938		5971	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
3933-869	- 3.3	½	+ 9.0	½	+ 18.9	½			- 9.9	½			+ 4.1	½
4026-352							- 45.7	½	- 14.1	½	- 7.1	½	- 7.9	½
4101-890	+ 12.2	½					- 29.1	½	- 16.3	½			- 5.6	½
4128-211	+ 7.7	½	+ 7.7	½	+ 21.0	½	- 17.3	½	- 12.6	½				
4131-047	+ 10.6	½											- 5.7	½
4340-634	+ 17.1	½	+ 3.4	½	+ 25.0	½	- 27.2	½	- 37.4	½				
4388-100							- 34.0	½			- 45.5	½		
4471-676	- 6.2	½					- 31.4	½			- 32.7	½	- 13.7	½
4481-400	+ 14.4	1	+ 20.2	½	+ 26.2	½	- 26.4	½	- 22.6	½	- 29.9	½	- 26.4	½
Weighted mean	+ 7.4		+ 10.40		+ 22.6		- 28.3		- 19.4		- 26.5		- 9.2	
V_a	- 12.57		- 12.77		- 13.73		- 18.31		- 18.62		- 18.68		- 17.89	
V_d	- 0.09		- 0.03		- 0.10		- 0.09		- 0.15		- 0.10		- 0.11	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 5.6		- 2.7		+ 8.5		- 47.0		- 38.4		- 45.5		- 27.5	

MEASURES OF ω CASSIOPELE—Continued

λ	5972		5984		6291		6303		6316		6321		6378	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
3933 869	+ 13.1	$\frac{1}{2}$	+ 29.4	$\frac{1}{2}$	- 54.7	$\frac{1}{2}$			- 62.0	$\frac{1}{2}$	- 81.2	$\frac{1}{2}$	- 57.3	$\frac{1}{2}$
4026 352	+ 12.1	$\frac{1}{2}$	+ 27.2	$\frac{1}{2}$	- 60.7	$\frac{1}{2}$	- 77.0	$\frac{1}{2}$	- 67.7	$\frac{1}{2}$	- 65.0	$\frac{1}{2}$	- 59.8	$\frac{1}{2}$
4101 890			+ 16.0	$\frac{1}{2}$	- 62.1	$\frac{1}{2}$							- 61.2	$\frac{1}{2}$
4128 211					- 56.9	$\frac{1}{2}$	- 63.6	$\frac{1}{2}$					- 75.0	$\frac{1}{2}$
4131 047	+ 17.3	$\frac{1}{2}$	+ 21.0	$\frac{1}{2}$	- 71.1	$\frac{1}{2}$	- 69.4	$\frac{1}{2}$					- 57.4	$\frac{1}{2}$
4340 634			+ 6.8	$\frac{1}{2}$	- 76.5	$\frac{1}{2}$	- 70.9	$\frac{1}{2}$			- 68.6	$\frac{1}{2}$	- 54.5	$\frac{1}{2}$
4471 676	+ 11.2	$\frac{1}{2}$	+ 37.0	$\frac{1}{2}$			- 59.4	$\frac{1}{2}$	- 82.9	$\frac{1}{2}$	- 79.2	$\frac{1}{2}$	- 54.9	$\frac{1}{2}$
4481 400	+ 10.0	$\frac{1}{2}$	+ 18.9	$\frac{1}{2}$	- 66.0	$\frac{1}{2}$	- 57.4	$\frac{1}{2}$	- 61.9	$\frac{1}{2}$				
Weighted mean	+ 12.45		+ 22.5		- 66.0		- 61.9		- 67.3		- 72.7		- 57.2	
V_a	- 17.25		- 16.09		+ 18.25		+ 18.23		+ 18.18		+ 18.14		+ 16.43	
V_d	- 0.12		- 0.12		+ 0.12		0.00		- 0.02		0.00		+ 0.08	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 5.5		+ 6.0		- 47.9		- 46.9		- 49.4		- 51.8		- 41.0	

MEASURES OF ω CASSIOPEIÆ—Continued.

λ	6110		6423		6430		6434		6448		6458		6467	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
3933-860	- 32.7	$\frac{1}{2}$	- 43.8	$\frac{1}{2}$	- 33.5	$\frac{1}{2}$	- 23.9	1	- 14.7	$\frac{1}{2}$	- 33.6	1	- 25.5	1
4026-352	- 26.9	$\frac{1}{2}$	- 57.2	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	- 11.3	$\frac{1}{2}$	.....	.....
4101-890	- 34.4	$\frac{1}{2}$	- 35.3	$\frac{1}{2}$	- 45.6	$\frac{1}{2}$	- 38.0	$\frac{1}{2}$	- 25.0	$\frac{1}{2}$	- 29.4	$\frac{1}{2}$	.....	.....
4128-211	.....	.....	- 39.9	$\frac{1}{2}$	- 34.2	$\frac{1}{2}$	- 25.6	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....
4131-017	- 41.8	$\frac{1}{2}$	- 27.6	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4310-631	- 43.9	1	- 50.6	$\frac{1}{2}$	- 51.8	$\frac{1}{2}$	- 25.9	1	- 9.0	$\frac{1}{2}$	- 28.1	1	- 34.9	1
4388-100	.....	.....	.....	.....	- 36.1	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....
4471-676	.....	.....	- 44.6	$\frac{1}{2}$	- 52.0	$\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....
4481-400	- 27.4	$\frac{1}{2}$	- 48.6	$\frac{1}{2}$	- 38.7	$\frac{1}{2}$	- 30.0	1	- 15.0	$\frac{1}{2}$	.....	.....	- 21.2	1
Weighted mean	- 36.7		- 43.6		- 41.4		- 27.90		- 16.0		- 27.6		- 27.20	
V_a	+ 15.87		+ 15.56		+ 15.01		+ 14.65		+ 14.09		+ 13.88		+ 13.69	
V_d	+ 0.06		+ 0.09		- 0.05		- 0.05		+ 0.03		0.00		+ 0.01	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 21.1		- 28.2		- 26.7		- 13.6		- 2.2		- 14.0		- 13.8	

MEASURES OF ω CASSIOPELE—*Continued.*

λ	6481		6488		6500		6506		6516		6536		6539	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
3933-869	- 11.2	$\frac{1}{4}$	+ 3.8	$\frac{1}{2}$	- 9.5	$\frac{1}{4}$	- 4.5	1	- 21.5	1	- 36.2	$\frac{1}{4}$		
3968-625					+ 13.9	$\frac{1}{4}$			- 17.3	$\frac{1}{2}$	- 41.2	$\frac{1}{4}$		
4026-352	- 9.5	$\frac{1}{2}$	- 0.9	$\frac{1}{2}$			- 5.6	$\frac{1}{2}$	- 33.4	$\frac{1}{2}$			- 49.2	$\frac{1}{4}$
4101-890	- 8.3	$\frac{1}{2}$	- 6.6	$\frac{1}{4}$							- 39.6	$\frac{1}{4}$		
4128-211	- 9.5	$\frac{1}{4}$	- 9.5	$\frac{1}{4}$							- 29.3	1	- 50.7	$\frac{1}{4}$
4131-017	- 5.7	$\frac{1}{4}$	- 9.5	$\frac{1}{4}$	- 1.1	$\frac{1}{2}$	- 19.1	1	- 22.5	1	- 30.9	$\frac{1}{2}$	- 51.4	1
4349-634	- 12.4	$\frac{1}{2}$	+ 4.5	1	+ 28.5	$\frac{1}{4}$	- 21.0	$\frac{1}{2}$			- 34.9	1		
4471-676			- 7.4	$\frac{1}{2}$	+ 1.2	$\frac{1}{2}$	+ 7.4	$\frac{1}{2}$	- 27.4	1				
4481-400	- 8.7	$\frac{1}{2}$	+ 7.5	$\frac{1}{2}$										
Weighted mean	- 9.6		+ 0.7		+ 4.1		- 9.5		- 24.20		- 33.7		- 50.6	
V_s	+ 13.25		+ 11.60		+ 11.13		+ 9.31		+ 8.99		+ 6.98		+ 6.07	
V_d	+ 0.03		- 0.09		- 0.02		+ 0.03		- 0.09		- 0.09		- 0.11	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	+ 3.5		+ 44.9		+ 9.9		- 0.5		- 15.6		- 27.4		- 44.9	

MEASURES OF ω CASSIOPELE.—*Continued.*

λ	6545		6552		6551		6656		6660		6665		6672	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
3933-869	- 47.0	$\frac{1}{2}$	- 50.9	$\frac{1}{2}$	+ 11.4	$\frac{1}{2}$	+ 19.1	$\frac{1}{2}$	+ 20.8	$\frac{1}{2}$	+ 3.1	$\frac{1}{2}$	- 5.7	$\frac{1}{2}$
3968-625			- 36.4	$\frac{1}{2}$							+ 9.1	$\frac{1}{2}$		
4026-352	- 48.5	$\frac{1}{2}$	- 53.8	$\frac{1}{2}$							+ 11.3	$\frac{1}{2}$	- 11.8	$\frac{1}{2}$
4101-890	- 33.1	$\frac{1}{2}$	- 57.5	$\frac{1}{2}$	+ 28.0	$\frac{1}{2}$	+ 28.0	$\frac{1}{2}$	+ 25.2	$\frac{1}{2}$	- 0.9	$\frac{1}{2}$	- 5.6	$\frac{1}{2}$
4128-241	- 55.0	$\frac{1}{2}$									+ 5.7	$\frac{1}{2}$		
4131-047					+ 7.7	$\frac{1}{2}$			+ 24.7	$\frac{1}{2}$	+ 1.9	$\frac{1}{2}$		
4267-3					+ 13.9	$\frac{1}{2}$								
4310-631	- 55.2	$\frac{1}{2}$	- 45.0	$\frac{1}{2}$	+ 20.4	$\frac{1}{2}$	+ 30.6	$\frac{1}{2}$	+ 28.3	$\frac{1}{2}$	+ 10.2	$\frac{1}{2}$	- 1.1	$\frac{1}{2}$
4471-676	- 48.3	$\frac{1}{2}$	- 69.3	$\frac{1}{2}$	+ 33.6	$\frac{1}{2}$					+ 6.2	$\frac{1}{2}$		
4481-400	- 49.8	$\frac{1}{2}$	- 66.0	$\frac{1}{2}$	+ 25.7	$\frac{1}{2}$	+ 28.8	$\frac{1}{2}$			+ 16.3	$\frac{1}{2}$	- 10.0	$\frac{1}{2}$
Weighted mean	- 48.8		- 51.1		+ 21.6		+ 26.7		+ 21.7		+ 7.6		- 6.2	
V_a	+ 5.48		+ 5.19		- 10.41		- 10.40		- 10.99		- 12.20		- 12.49	
V_d	- 0.10		- 0.04		0.00		- 0.03		- 0.06		+ 0.01		- 0.10	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 43.7		- 49.4		+ 11.2		- 16.0		+ 13.4		- 4.8		- 19.1	

MEASURES OF ω CASSIOPEE.—Continued

λ	6678		6686		6700		6708		6717		6718		6720	
	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.	Vel.	Wt.
3933-869	- 8.1	1			- 28.9	1	- 33.7	1	- 18.5	1	- 42.5	1		
4026-352							- 19.0	1	- 36.6	1	- 32.3	1		
4101-890	- 10.2	1	- 26.1	1			- 46.7	1	- 37.2	1	- 35.3	1		
4128-211							- 29.6	1			- 35.4	1		
4131-047	- 3.8	1	- 11.5	1					- 22.6	1	- 30.3	1	- 41.8	1
4340-631	- 14.7	1	- 29.3	1	- 30.6	1	- 44.8	1						
4471-676	- 16.7	1			- 39.8	1	- 28.8	1	- 27.5	1	- 25.0	1	- 36.3	1
4481-400			- 25.0	1	- 31.3	1								
Weighted mean	- 11.4		- 21.1		- 31.7		- 33.3		- 28.9		- 31.3		- 39.0	
V_a	- 13.32		- 13.55		- 14.72		- 15.13		- 15.84		- 16.36		- 16.52	
V_d	- 0.09		- 0.08		- 0.02		- 0.10		0.00		0.00		- 0.11	
Curv.	- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28		- 0.28	
Radial Velocity	- 25.1		- 35.0		- 46.7		- 48.8		- 45.0		- 50.9		- 55.7	

A period was roughly determined from the Ottawa series of spectrograms and this approximate period adjusted more carefully from eight plates taken at the Mt. Wilson and Yerkes observatories (Table II). The interval separating the earliest and the most recent plates is thirty periods. With the period 69.92 days thus determined, the fifty-two plates taken here were combined into thirteen normal places.

NORMAL PLACES.

	Julian Day	Phase	Velocity	Weight	O-C Preliminary	O-C Final
1	2,420,427.82	1.42	- 9.3	1.5	- 2.2	- 1.3
2	433.73	7.33	- 28.4	0.8	+ 6.0	+ 5.1
3	438.52	12.12	- 46.1	1.3	0.0	- 1.6
4	441.19	15.09	- 50.4	0.8	- 1.2	- 2.8
5	447.55	21.15	- 48.7	0.7	+ 1.1	- 0.3
6	451.56	28.16	- 41.1	1.2	+ 4.2	+ 3.4
7	460.59	31.19	- 40.9	0.9	- 2.0	- 2.3
8	468.19	41.79	- 27.8	1.0	+ 0.4	+ 0.8
9	473.54	47.14	- 19.8	1.0	- 0.7	+ 0.1
10	477.51	51.14	- 13.0	1.0	- 2.0	- 0.9
11	482.80	56.40	- 2.4	1.0	- 2.6	- 1.3
12	488.81	62.41	+ 11.3	0.9	+ 0.4	+ 1.7
13	491.46	65.06	+ 10.9	0.7	- 0.8	+ 0.6

Preliminary elements were obtained graphically,

$$P = 69.92 \text{ days}$$

$$e = 0.3$$

$$\omega = 53^\circ$$

$$K = 31.1 \text{ km.}$$

$$\gamma = 24.82 \text{ km.}$$

$$T = 2,420,426.4 \text{ J. D.}$$

and a least-squares solution was carried through for all the elements save P .

OBSERVATION EQUATIONS

	x	y	z	p	q	$-n$	Weight
1	1	+ 0.569	+ 0.031	- 1.161	+ 1.536	+ 2.2	1.5
2	1	- 0.307	- 1.260	- 1.113	+ 1.097	- 6.0	0.8
3	1	- 0.685	- 0.474	- 0.740	+ 0.465	0.0	1.3
4	1	- 0.785	+ 0.101	- 0.498	+ 0.204	+ 1.2	0.8
5	1	- 0.805	+ 0.830	- 0.070	- 0.101	- 4.1	0.7
6	1	- 0.659	+ 0.951	+ 0.304	- 0.280	- 4.2	1.2
7	1	- 0.152	+ 0.658	+ 0.535	- 0.381	+ 2.0	0.9
8	1	- 0.108	- 0.022	+ 0.718	- 0.194	- 0.4	1.0
9	1	+ 0.183	- 0.566	+ 0.760	- 0.579	+ 0.7	1.0
10	1	+ 0.413	- 0.920	+ 0.725	- 0.613	+ 2.0	1.0
11	1	+ 0.805	- 0.999	+ 0.511	- 0.669	+ 2.6	1.0
12 ...	1	+ 1.118	+ 0.063	+ 0.011	- 0.312	- 0.4	0.9
13....	1	+ 1.174	+ 0.806	- 0.356	+ 0.170	+ 0.8	0.7

where $x = \delta\gamma$
 $y = \delta K$
 $z = K\delta e$
 $p = K\delta\omega$
 $q = \frac{K\mu}{(1-e^2)^{\frac{3}{2}}} \delta T'$

NORMAL EQUATIONS.

$$\begin{aligned}
 12.800x + 0.506y - 1.054z - 0.689p + 0.648q + 0.550 &= 0 \\
 + 5.864y - 1.384z + 0.372p - 0.126q + 9.124 &= 0 \\
 + 6.157z + 0.024p - 0.225q - 2.400 &= 0 \\
 + 6.297p - 6.127q + 3.414 &= 0 \\
 + 6.595q - 2.211 &= 0
 \end{aligned}$$

whence $\delta\gamma = 0.00$ km.
 $\delta K = -1.46$ km.
 $\delta e = 0.00$
 $\delta\omega = -3^\circ.03$
 $\delta T' = -0.38$ day

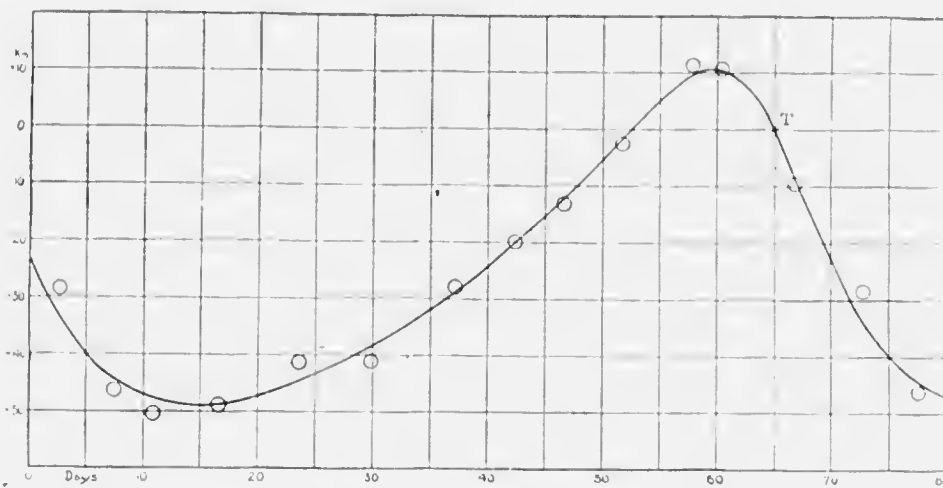
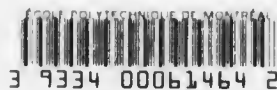
The above corrections lowered Σpv^2 from 75.0 to 51.5 and agreement between the residuals computed from the ephemeris and the observation equations showed that further solutions would leave the elements unaltered.

FINAL ELEMENTS

$$\begin{aligned}
 P &= 69.92 \text{ days} \\
 e &= 0.30 \pm 0.024 \\
 \omega &= 49^{\circ}.97 \pm 4^{\circ}.08 \\
 K &= 29.64 \text{ km.} \pm 0.73 \\
 \gamma &= -24.82 \text{ km.} \pm 0.40 \\
 T &= 2,120,426.02 \text{ J. D.} \pm 0.67 \\
 a \sin i &= 27,190,000 \text{ km.} \\
 \frac{m_1^3 \sin^3 i}{(m + m_1)^2} &= 0.164 \text{ } \odot
 \end{aligned}$$

The individual observations were represented graphically and the residuals are shown in Tables II and III. The probable error of a single plate, no attention being given to the weight, is 2.8 km.

Dominion Observatory,
Ottawa,
February, 1915.



Velocity Curve of ω Cassiopeiae.

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